

Claims

[1] A muller comprising:

a nozzle unit including a feed line and a hollow pipe line for surrounding the feed line and radially spaced from an outer surface of the feed line, the feed line having one end into which air of high pressure and very low temperature flows and the other end at which a nozzle is provided;

a mulling unit connected to the nozzle at one end thereof, the mulling unit including a mulling head spaced from the nozzle on the same axis as the nozzle therein and a downwardly tapered, opened outlet; and

an input device connected to the feed line at the middle of the nozzle unit, the input device including a hopper and a feeder for supplying a material to be processed,

whereby the material inputted from the input device is mixed with the air within the feed line and injected from the nozzle to collide with the mulling head.

[2] The muller as set forth in claim 1, wherein the feed line and the hollow pipe line include a first feed line and a second feed line, and a first hollow pipe line and a second hollow pipe line, respectively,

wherein the nozzle unit further includes:

a first connector connected to the first feed line and the first hollow pipe line, respectively, the first connector having a flow path for communicating with the first feed line, an inlet for an inflow of the air, and a refrigerant inlet, respectively, the flow path of the first connector communicating with the air inlet and the refrigerant inlet, respectively;

a second connector for connecting the first feed line and the first hollow pipe line with the second feed line and the second hollow pipe line, respectively, the second connector having a flow path for communicating with the first feed line and the second feed line, and an inlet hole for an inflow of the material supplied from the input device, respectively, the flow path of the second connector communicating with the inlet hole; and

a third connector for connecting the second feed line and the second hollow pipe line with the nozzle, respectively, the third connector having a flow path for communicating with the second feed line, the flow path of the third connector communicating with a flow path within the nozzle,

whereby the first connector, the second connector, the third connector, the first

feed line, the second feed line, the first hollow pipe line, the second hollow pipe line, and the nozzle are arranged as separate elements, each element of the nozzle unit being formed with a flange, adjacent ones of the elements being connected through the facing flanges, while interposing a sealing gasket therebetween.

[3] The muller as set forth in claim 1 or 2, wherein the mulling unit further includes a T-shaped hollow body and an L-shaped flow path, wherein the hollow body is connected with a third connector of the nozzle unit while having the nozzle at one end of the flow path thereof, the mulling head with a very high hardness facing an injection portion of the nozzle.

[4] The muller as set forth in claim 1 or 2, wherein the input device loads a crushed material, the input device including the hopper with a high capacity formed with an upper cover and the feeder for supplying the material to an outflow pipe of the hopper to mix the material with the air in the feed line, the feeder including a feed screw and a feed motor for driving the feed screw, the input device further including a pipe line for connecting an upper part of the hopper with an inlet hole of the nozzle unit to equivalently maintain inner pressure within the hopper and air pressure within the feed line.

[5] The muller as set forth in claim 1, wherein the muller further comprises additional nozzle units including feed lines, hollow pipe lines, and connectors connected with nozzles respectively having reduced nozzle diameters, and additional mulling units connected with the additional nozzle units, whereby the additional mulling units are successively connected in such a manner that one mulling unit is connected to another mulling unit arranged upstream thereof.

[6] The muller as set forth in claim 5, wherein each of the nozzle diameters is gradually reduced.

[7] The muller as set forth in claim 1, wherein the input device loads a crushed material, the input device including the hopper which is an open type hopper for successively inputting the material, and the feeder for supplying the material to an outflow pipe of the hopper to mix the material with the air in the feed line, the feeder including a feed screw and a feed motor for driving the feed screw, the hopper being provided at a lower part thereof with a ball valve, the ball valve being rotated by a servo motor, the ball valve having upper and lower through holes blocked by a partition, the feeder and the lower portion of the ball valve being connected by a pipe line for maintaining their inner pressures.

[8] The muller as set forth in claim 1 or 5, wherein the muller further comprises a

material separator for conforming a cyclone process, the separator being connected to the outlet of the mulling unit by a pipe line, wherein the separator is connected to at least one separator additionally arranged downstream thereof so as to conform multistage cyclone processes.

[9] The muller as set forth in claim 1, wherein the hollow pipe line of the nozzle unit is provided with ports through which refrigerant is introduced and discharged for cooling circulation.